Sony International (Europe) GmbH
"Optimized Synchronization Structure"
FB99022

Claims:

1. Synchronization preamble structure for the synchronization of a receiver of a OFDM transmission system, wherein

- the synchronization structure comprises at least one first part (A-FIELD) and at least one second part (B-FIELD,
- at least one first part (A-FIELD) being designed for a coarse frame detection and/or a AGC control, and
- at least one second part (B-FIELD) following the at least one first part in the time domain,

the at least one second part (B-FIELD) being designed for a timing and frequency synchronization,

- the at least one first part (A-FIELD) and the at least one second part (B-FIELD) containing Inverse Fast Fourier (IFFT) transformed frequency domain sequences of complex symbols,

characterized in that

the frequency domain sequence of the at least one first part (A-FIELD) is set depending on the sequence of the at least one second part (B-FIELD) of the synchronization preamble structure such that the synchronization performance of the resulting time domain waveform is optimized.

2. Synchronization preamble structure according to claim 1,
characterized in that
the frequency domain sequence of the at least one first part (A-FIELD) is set depending on the frequency domain sequence of the at least one second part (B-FIELD) such that a second autocorrelation peak mainly generated by the at least one second part (B-FIELD) of the synchronization preamble structure is optimized.

3. Synchronization preamble structure according to claim 2,
characterized in that
the time domain signal of the synchronization preamble is generated by mapping frequency domain sequences of 12 complex symbols to a 64 point IFFT,
wherein the remaining inputs of the IFFT are set to zero,
the last six complex symbols of the sequence of the at least one first part being identical with the last six complex symbols of the sequence of the at least one second part.

4. Synchronization preamble structure according to claim 2 ~~or 3~~,
characterized in that
the time domain signal of the synchronization preamble is generated by mapping frequency domain sequences of 12 complex symbols to a 64 point IFFT,
wherein the remaining inputs of the IFFT are set to zero,
the first six complex symbols of the sequence of the at least one first part being respectively different to the first six complex symbols of the sequence of the at least second part.

5. Synchronization preamble structure according to ~~anyone of claims 2 to 4~~,
characterized in that
the frequency domain sequence of the at least one first part (A-FIELD) is
$S_A = (1-i), (1+i), (-1+i), (-1-i), (1-i), (-1-i), (1-i), (-1-i), (1-i), (-1-i), (-1+i), (1+i),$
and the frequency domain sequence of the at least one second part (B-FIELD) is
$S_B = (1+i), (-1+i), (-1-i), (1-i), (-1-i), (1-i), (1-i), (-1-i), (1-i), (-1-i), (-1+i), (1+i).$

6. OFDM transmitter,
designed for transmitting a synchronization preamble according to ~~anyone of the preceding claims~~ in the BCCH channel of an OFDM system.

7. Method for the synchronization of a receiver of a OFDM transmission,
wherein
- the synchronization structure comprises at least one first part (A-FIELD) and at least one second part (B-FIELD,

- at least one first part (A-FIELD) being designed for a coarse frame detection and/or a AGC control, and

- at least one second part (B-FIELD) following the at least one first part in the time domain,

the at least one second part (B-FIELD) being designed for a timing and frequency synchronization,

- the at least one first part (A-FIELD) and the at least one second part (B-FIELD) containing Inverse Fast Fourier (IFFT) transformed frequency domain sequences of complex symbols,

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the step of setting the frequency domain sequence of the at least one first part (A-FIELD) depending on the sequence of the at least one second part (B-FIELD) of the synchronization preamble structure such that the synchronization performance of the resulting time domain waveform is optimized.

8. Method according to claim 7,
characterized in that
the frequency domain sequence of the at least one first part (A-FIELD) is set depending on the frequency domain sequence of the at least one second part (B-FIELD) of the synchronization preamble structure such that a second autocorrelation peak mainly generated by the at least one second part (B-FIELD) is optimized.

9. Method according to claim 8,
characterized in that
the time domain signal of the synchronization preamble is generated by mapping frequency domain sequences of 12 complex symbols to a 64 point IFFT,
wherein the remaining inputs of the IFFT are set to zero,
the last six complex symbols of the sequence of the at least one first part being identical with the last six complex symbols of the sequence of the at least one second part.

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10. Method according to claim 8 ~~or 9~~,
characterized in that

the time domain signal of the synchronization preamble is generated by mapping frequency domain sequences of 12 complex symbols to a 64 point IFFT,
wherein the remaining inputs of the IFFT are set to zero,
the first complex symbols of the sequence of the at least one first part being respectively different to the first six complex symbols of the sequence of the at least one second part.

11. Method according to anyone of claims 8 to 10,
characterized in that
the frequency domain sequence of the at least one first part is
S_A = (1-i), (1+i), (-1+i), (-1-i), (1-i), (-1-i), (1-i), (-1-i), (1-i), (-1-i), (-1+i), (1+i),
and the frequency domain sequence of the at least one second part is
S_B = (1+i), (-1+i), (-1-i), (1-i), (-1-i), (1-i), (1-i), (-1-i), (1-i), (-1-i), (-1+i), (1+i).

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